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EXAMINER	
FERNANDEZ RIVAS, OMAR F	
ART UNIT	**PAPER NUMBER**
2129	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/15/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)
	10/681,491	HONKANEN, TOMI
	Examiner	Art Unit
	Omar F. Fernández Rivas	2129

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 November 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/27/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is in response to an AMENDMENT made by the Applicant filed on November 27, 2006.

2. The Office Action of August 21, 2006 is incorporated into this Final Office Action by reference.

Status of Claims

3. Claims 1-15 have been amended. Claims 1-15 are pending on this application.

Claim Rejections - 35 USC § 101

4. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-15 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The computer system must set forth a practical application of judicial exception to produce a real-world result. Benson, 409 U.S. at 71-72, 175 USPQ at 676-77. The invention is ineligible because it has not been limited to a substantial practical application.

For a claimed invention to be statutory the claimed invention must produce a useful, concrete, and tangible result. The Courts have found that subject matter that is not a practical application or use of an idea, a law of nature or a natural phenomenon is not patentable. See, e.g., *Rubber-Tip Pencil Co. v. Howard*, 87 U.S. (20 Wall.) 498, 507 (1874) ("idea of itself is not patentable, but a new device by which it may be made practically useful is"); *Warmerman*, 33 F.3d at 1360, 31 USPQ2d at 1759.

For a claimed invention to be statutory under 35 U.S.C. 101, the claims must have the FINAL RESULT (not the steps) produce a useful (specific, substantial, AND credible), concrete (substantially repeatable/ non-unpredictable), AND tangible (real world/ non-abstract) result.

If the specification discloses a practical application but the claim is broader than the disclosure such that it does not require the practical application, then the claim must be amended. A claim that recites a computer that solely calculates a mathematical formula is not statutory.

The claims fail to provide a tangible result, and there must be a practical application, by either: 1) transforming (physical thing) or 2) by having the FINAL RESULT (not the steps) achieve or produce a useful (specific, substantial, AND credible),concrete (substantially repeatable/non-unpredictable), AND tangible (real world/non-abstract) result.

In the present case, claim 1 describes a method for detecting risky types of data structures on a computer program code using a neural network. The claim describes the steps performed by the network to detect the type of a data structure in a computer program. However, the output of this detection is not presented or outputted to a device or presented to a user in a way that would produce a useful and tangible result. The Examiner notes that the claim recites "presenting the type of said at least one data structure as data indicating a degree of risk of said at least one data structure". However, the intent of the word "presenting" is not defined in the claims or in the specification. The Examiner considers that "presenting" could mean the result of manipulating data in a computer, which is not statutory, or simply outputting data, which is not statutory since data alone has no physical structure and does not itself perform any useful, concrete and tangible result.

The claims fail to provide a useful result because the claimed subject matter fails to sufficiently reflect at least one practical utility set forth in the descriptive portion of the specification and a tangible result because the claimed subject matter fails to produce a result that is limited to having real world value rather than a result that may be interpreted to be abstract in nature as, for example, a thought, a computation, or manipulated data.

Claims 2-7 further describe the steps taken by the network to perform the detection, but fail to provide the useful and tangible result lacking on claim 1 and are rejected on the same basis.

Claims 8-15 recite subject matter similar to that of claims 1-7 and are rejected on the same basis.

Claim 15 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The claim is directed to a computer program (software "per se") and is not embodied on a computer readable medium. A claim that recites a piece of software alone without any link to a hardware component (computer readable medium) is directed to non-statutory subject matter since there is no relationship between the computer software and hardware components which permits the functionality of the software to be realized.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 3, 8, 10 and 15 rejected under 35 U.S.C. 103(a) as being unpatentable over Khoshgoftaar et al. in view of Khoshgoftaar et al. ("A Neural Network Modelling Methodology for the Detection of High-Risk Programs", referred to as **Khoshgoftaar1**; "Application of Neural Networks to Software Quality Modeling of a Very Large Telecommunications System", referred to as **Khoshgoftaar2**).

Claims 1, 8, and 15

Khoshgoftaar1 teaches a method for detecting risky types of data structures of a computer program code with a neural network (**Khoshgoftaar1**: page 302, abstract, lin 5-20), said neural network comprising at least two neurons, and the neurons being related to each other by a topological arrangement involving a neighborhood definition (**Khoshgoftaar1**: page 304, section 2.2; page 305, Figure 1; Examiner's Note (EN): the topological arrangement in the document is a feed-forward network. The neighborhood definitions are the interconnections between the neurons), each of the neurons comprising a vector for representing elements of an input data space (**Khoshgoftaar1**: page 304, section 2.2; page 305, lin 6-22; page 307, col 1, lin 5-8; Figure 1; EN: each of the neurons will operate on the metrics (vectors) received as input in order to make its classification), and the data structures whose degrees of risk being detected comprising at least two data elements (**Khoshgoftaar1**: page 303, lin 17-22; page 305, lin 6-22; Figure 1; EN: the complexity metric values are data elements of the program module (data structure)), wherein the method comprises: extracting information of at least two data elements from at least one data structure (**Khoshgoftaar1**: page 303, col 1, lin 17-22; page 305, lin 6-22; Figure 1; EN: the complexity metric values are extracted from the program module), forming at least two input vectors from said extracted information of the data elements, the vectors being compatible with the vectors of the neurons (**Khoshgoftaar1**: page 305, lin 6-22; Figure 1; EN: each complexity metric (vector) is inputted to the neural network. The network has been trained with software complexity data, so the vectors are compatible).

Khoshgoftaar1 does not teach at least one neuron having an associated label indicating the type of the neuron, comparing said input vectors with said vectors of the neurons, and detecting the type of said at least one data structure by using an associated label obtained on the basis of said comparison and presenting the type of said at least one data structure as data indicating a degree of risk of said at least one data structure

Khoshgoftaar2 teaches at least one neuron having an associated label indicating the type of the neuron (**Khoshgoftaar2**, page 905, col 1, lin 53-55; EN: there are two output neurons, one for each class. The classes are considered labels for each neuron (fault-prone and not fault-prone), comparing said input vectors with said vectors of the neurons, and detecting the type of said at least one data structure by using an associated label obtained on the basis of said comparison (**Khoshgoftaar2**, page 905, col 1, lin 53-55; page 907, col 1, lin 17-31; EN: the input vector is analyzed and classified as either fault-prone or not fault prone depending on the output neuron with the highest value) and presenting the type of said at least one data structure as data indicating a degree of risk of said at least one data structure (**Khoshgoftaar2**, page 905, col 1, lin 53-55; page 908, col 1, lin 21-25; EN: outputting the class of the modules (fault prone or not fault prone). Moreover, using green for not fault prone, red for fault prone and yellow for those near the boundary is presenting indicating the fault risk of the module).

It would have been obvious to one of ordinary skill in the arts at the time of the applicant's invention to modify the teachings of Khoshgoftaar1 by incorporating at least one neuron having an associated label indicating the type of the neuron, comparing the input vectors with said vectors of the neurons, detecting the type of the data structure by using an associated label obtained on the basis of said comparison and presenting the type of said at least one data structure as data indicating a degree of risk of said at least one data structure as taught by Khoshgoftaar2 for the purpose of determining the type of a data structure by having some metric to correctly classify the type of the data structure depending on the label and the output produced by the neuron.

Claims 3 and 10

Khoshgoftaar1 does not teach said neurons have been labeled on the basis of a labeling data item, wherein said labeling data item is examined to be at least one of the following; safe type data item, risky type data item or fail type data item.

Khoshgoftaar2 teaches said neurons have been labeled on the basis of a labeling data item, wherein said labeling data item is examined to be at least one of the following; safe type data item, risky type data item or fail type data item (**Khoshgoftaar2**, page 905, col 1, lin 53-55; page 908, col 1, lin 21-23; EN: fault-prone modules are risky types data items and not-fault prone modules are safe type data items).

It would have been obvious to one of ordinary skill in the arts at the time of the applicant's invention to modify the teachings of Khoshgoftaar1 by incorporating a labeling data item to a neuron as taught by Khoshgoftaar2 for the purpose of making the classification depending on the label of the classifying neuron.

Response to Applicant's arguments

6. The Applicant's arguments have been fully considered but are not persuasive.

In reference to Applicant's arguments:

The Khoshgoftaar1 reference does not teach to compare input vectors with vectors of neurons, said vectors of neurons representing elements of an input data space, as recited in the independent claims of the present application.

Examiner's response:

Applicant cannot show non-obvious by attacking the references individually where as here the rejection of these limitations is based on a combination of references see In re Keller USPQ 871 (CCPA 1981). The test for combining references is not what individual references themselves suggest but rather what the combination of disclosures taken as a whole would suggest to one of ordinary skill in the art. In re Keller, 648 F.2d 413, 208 USPQ 871 (CCPA 1981); In re Sernaker, 702 F.2d 989, 217 USPQ 1 (Fed.

Cir. 1983); In re McLaughlin, 170 USPQ 209 (CCPA 1971). References are evaluated by what they suggest to one versed in the art, rather than by their specific disclosures. In re Bozek, 163 USPQ 545 (CCPA 1969).

The limitation compare input vectors with vectors of neurons was not rejected by the Khoshgoftaar1 reference, but by the Khoshgoftaar2 reference. Therefore the Applicant's argument is moot.

As for the limitation vectors of neurons representing elements of an input data space, as shown above in the rejection of claims 1, 8 and 15, the Examiner has provided an explanation on how he interprets the Khoshgoftaar1 reference to read on the limitations claimed by Applicant (**Khoshgoftaar1**: page 304, section 2.2; page 305, lin 6-22; page 307, col 1, lin 5-8; Figure 1; EN: each of the neurons will operate on the metrics (vectors) received as input in order to make its classification). The Applicant has not explained how the Examiner's reasoning is wrong. Accordingly, Applicant has failed to carry his burden of showing how the claim limitation cited is not disclosed by the Khoshgoftaar1 reference. On this basis, Examiner finds Applicant's argument to be unpersuasive and the rejection STANDS.

In reference to Applicant's arguments:

The Khoshgoftaar1 reference does not teach to provide each neuron with a vector that represents elements of an input data space as recited in the independent claims of the present application.

Examiner's response:

The claims and only the claims form the metes and bounds of the invention. The Examiner has full latitude to interpret each claim in the broadest reasonable sense.

As shown above in the rejection of claims 1, 8 and 15, the Examiner has provided an explanation on how he interprets the Khoshgoftaar1 reference to read on the limitations claimed by Applicant (**Khoshgoftaar1**: page 304, section 2.2; page 305, lin 6-22; page 307, col 1, lin 5-8; Figure 1; EN: each of the neurons will operate on the metrics (vectors) received as input in order to make its classification). The Applicant has not explained how the Examiner's reasoning is wrong. Accordingly, Applicant has failed to carry his burden of showing how the claim limitation cited is not disclosed by the Khoshgoftaar1 reference. On this basis, Examiner finds Applicant's argument to be unpersuasive and the rejection STANDS.

In reference to Applicant's arguments:

The Khoshgotaar2 reference does not teach to compare input vectors with vectors of neurons, said vectors of neurons representing elements of an input data space, as recited in the independent claims of the present application.

Examiner's response:

Applicant cannot show non-obvious by attacking the references individually where as here the rejection of these limitations is based on a combination of references see In re Keller USPQ 871 (CCPA 1981). The test for combining references is not what individual references themselves suggest but rather what the combination of disclosures taken as a whole would suggest to one of ordinary skill in the art. In re Keller, 648 F.2d 413, 208 USPQ 871 (CCPA 1981); In re Sernaker, 702 F.2d 989, 217 USPQ 1 (Fed. Cir. 1983); In re McLaughlin, 170 USPQ 209 (CCPA 1971). References are evaluated by what they suggest to one versed in the art, rather than by their specific disclosures. In re Bozek, 163 USPQ 545 (CCPA 1969).

The limitation vectors of neurons representing elements of an input data space, this limitation was not rejected by the Khoshgotaar2 reference but by the Khoshgotaar1 reference. Therefore, the Applicant's argument is moot.

As for the limitation compare input vectors with vectors of neurons, Khoshgoftaar2 teaches that the network is trained to find a vector of connection weights (vectors of neurons) that minimize the errors in the training data set (input vector) (**Khoshgoftaar2**, page 905, col 1, lin 53 to C2, L29; page 907, col 1, lin17-31). To do this, the network has to compare the expected output of the training data set and the output produced by the neurons. Moreover, to determine the misclassification rate of the training data set and the validate data set, they must have been compared to the weight vectors.

In reference to Applicant's arguments:

The Khoshgoftaar2 reference does not teach to provide each unit (neuron) with a vector that represents elements of an input data space as recited in the independent claims of the present application.

Examiner's response:

This limitation was not rejected by the Khoshgoftaar2 reference, but by the Khoshgoftaar1 reference. Therefore the Applicant's argument is moot.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2, 4-7, 9, 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Khoshgoftaar1 and Khoshgoftaar2 as set forth above and further in view of Pedrycz et al. ("Self Organizing Maps as a tool for Software Analysis"; referred to as **Pedrycz**).

Claims 2 and 9

Khoshgoftaar1 and Khoshgoftaar2 do not teach said vectors of the neurons have been formed by applying a self-organizing learning process, such that learning data vectors have been allowed to change said vectors of the neurons by using a neighborhood mapping.

Pedrycz teaches said vectors of the neurons have been formed by applying a self-organizing learning process, such that learning data vectors have been allowed to change said vectors of the neurons by using a neighborhood mapping (**Pedrycz**: page 93, abstract; page 94 col 1, lin 14-34; page 94, col 2, lin 18-28; Figure 2; EN: updating the weight vectors of the neurons and the weight vectors of the neurons in its vicinity).

It would have been obvious to one of ordinary skill in the arts at the time of the applicant's invention to modify the combined teachings of Khoshgoftaar1 and Khoshgoftaar2 by applying a self-organizing learning process where the vectors of the neurons are changed by using a neighborhood mapping as taught by Pedrycz for the purpose of having an usupervised learning process where the connections between the neurons are updated to produce the desired output from the network.

Claims 4 and 11

Khoshgoftaar1 and Khoshgoftaar2 do not teach said input vectors are compared to the vector of the neuron by using at least one of the following methods: the Euclidean distance, the Hamming distance, the Taxicab drivers distance, L1 norm, or dot product.

Pedrycz teaches aid input vectors are compared to the vector of the neuron by using at least one of the following methods: the Euclidean distance, the Hamming distance, the Taxicab drivers distance, L1 norm, or dot product (**Pedrycz**: page 94 col 1, lin 14-25).

It would have been obvious to one of ordinary skill in the arts at the time of the applicant's invention to modify the combined teachings of Khoshgoftaar1 and Khoshgoftaar2 by comparing the input vector with the vector of the neuron by using at least one of the following methods: the Euclidean distance, the Hamming distance, the Taxicab drivers distance, L1 norm, or dot product as taught by Pedrycz for the purpose of having a measure of the difference between the data input and the data in the neuron so that a correct classification can be performed by the network.

Claims 5 and 12

Khoshgoftaar1 and Pedrycz do not teach the type of said at least one data structure is detected by selecting the label of a neuron whose vector has the closest metric.

Khoshgoftaar2 teaches the type of said at least one data structure is detected by selecting the label of a neuron whose vector has the closest metric (**Khoshgoftaar2**, page 905, col 1, lin 53-55; EN: indicating the class (label) by selecting the output neuron with the greatest value (closest metric)).

It would have been obvious to one of ordinary skill in the arts at the time of the applicant's invention to modify the combined teachings of Khoshgoftaar1 and Pedrycz by detecting the type of the data structure by selecting the label of the neuron with the closest metric as taught by Khoshgoftaar2 for the purpose of classifying the data structure based on the label of the neuron that most closely match the input vector fed to the network.

Claims 6 and 13

Khoshgoftaar1 and Khoshgoftaar2 do not teach the type of said at least one data structure is detected by selecting the label of the closest neighbor of the neuron whose vector has the closest metric.

Pedrycz teaches the type of said at least one data structure is detected by selecting the label of the closest neighbor of the neuron whose vector has the closest metric (**Pedrycz**: page 94 col 1, lin 14-25; page 94, col 2, lin 18-32; Figure2; page 95, col 2, lin 25-46; table 2; EN: modifying weight vectors and clustering the modules that belong to a neuron. Table 2 shows the labels for the neurons (A-keyword, B-exception, C-handler, etc)).

It would have been obvious to one of ordinary skill in the arts at the time of the applicant's invention to modify the combined teachings of Khoshgoftaar1 and

Khoshgoftaar2 by detecting the type of the data structure by selecting the label of the closest neighbor of the neuron whose vector has the closest metric as taught by Pedrycz for the purpose of classifying the data structure based on the label of the neurons that most closely match the input vector fed to the network.

Claims 7 and 14

Khoshgoftaar1 and Khoshgoftaar2 do not teach the type of said at least one data structure is detected by selecting the label of the closest labeled neuron on the map next to the neuron whose vector has the closest metric.

Pedrycz teaches the type of said at least one data structure is detected by selecting the label of the closest labeled neuron on the map next to the neuron whose vector has the closest metric (**Pedrycz**: page 94 col 1, lin 14-25; page 94, col 2, lin 18-32; Figure2; page 95, col 2, lin 25-46; table 2; EN: modifying weight vectors of the neurons on the vicinity of the winning neuron and clustering the modules that belong to a neuron. Table 2 shows the labels for the neurons (A-keyword, B-exception, C-handler, etc)).

It would have been obvious to one of ordinary skill in the arts at the time of the applicant's invention to modify the combined teachings of Khoshgoftaar1 and Khoshgoftaar2 by detecting the type of the data structure by selecting the label of the closest labeled neuron on the map next to the neuron whose vector has the closest metric as taught by Pedrycz for the purpose of classifying the data structure based on the label of the neurons that most closely match the input vector fed to the network.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Claims 1-15 are rejected.

Correspondence Information

10. Any inquires concerning this communication or earlier communications from the examiner should be directed to Omar F. Fernández Rivas, who may be reached Monday through Friday, between 8:00 a.m. and 5:00 p.m. EST. or via telephone at (571) 272-2589 or email omar.fernandezrivas@uspto.gov.

If you need to send an Official facsimile transmission, please send it to (571) 273-8300.

If attempts to reach the examiner are unsuccessful the Examiner's Supervisor, David Vincent, may be reached at (571) 272-3080.

Hand-delivered responses should be delivered to the Receptionist @ (Customer Service Window Randolph Building 401 Dulany Street Alexandria, VA 22313), located on the first floor of the south side of the Randolph Building.

Omar F. Fernández Rivas
Patent Examiner
Artificial Intelligence Art Unit 2129
United States Department of Commerce
Patent & Trademark Office

Thursday, March 08, 2007

OFR

3/12/07
DAVID VINCENT
SUPERVISORY PATENT EXAMINER